

### REMARKS

Upon entry of the amendment made herein, claims 1-17, 19-36 are pending in the application. Claims 1, 3, 5, 13-15, 19, 20 and 35 are amended herein. Support for the amendments made herein can be found at least at page 7, lines 1-8 and 18-22; page 9, lines 7-10; page 12, lines 2-4; page 12, line 19 - page 13, line 12; and at page 17, lines 1-13. No new matter is added.

#### **Rejections under 35 U.S.C. §112, First Paragraph**

The Examiner has rejected claims 3, 13-16 and 28-34 under 35 U.S.C. §112, first paragraph, for lack of enablement. Specifically, the Examiner indicates that while the specification is enabling for the alignment of cellulose fibers, it does not enable the alignment of particles of a specific diameter. Applicants traverse this rejection with respect to the claims as amended herein. Specifically, the claims have been amended to delete the term “particle” and replaced it with the term “fibers of cellulose,” which the Examiner indicates is enabled by the specification. (*See*, Office Action at page 3). As such, this rejection is moot and should be withdrawn.

The Examiner has rejected claims 20-26 under 35 U.S.C. §112, first paragraph, for lack of enablement. Specifically, the Examiner indicates that the instant specification does not disclose any microorganism and that while several types of microorganisms have been used in the prior art, without the disclosure of the central actor in the delignification process, of which biological delignification is an unpredictable and commercially unproven process, one of ordinary skill in the art could not practice the invention. (*See*, Office Action at pages 3-4). Applicants disagree.

Applicants submit that claims 21-25 are not directed to an inoculum or microorganisms identified as non-enabled by the Examiner and thus are not subject to the instant rejection. Clarification is requested with respect to these claims.

Applicants traverse the rejection with respect to claims 20 and 26 as amended herein. With respect to the Examiner's assertion that biological delignification is an unpredictable and commercially unproven process, the Examiner has failed to produced any evidence to support such an assertion. In contrast, Applicants submit that that the delignification process is well known in the art and is well within the purview of a skilled artisan utilizing standard techniques. Applicants further submit that a person of ordinary skill in the art would readily recognize that the delignification process of the instant invention is general; and, with suitable changes in the values of the process parameters, this process can be adapted for use with virtually any type of cellulose containing material from wood of trees to the stalks of wheat or other cereal crops or grasses without undue experimentation since such simple substitute of microorganisms is routine in the art. Following the teachings of the instant specification in combination with that known in the art, a person or ordinary skill in the art would recognize a suitable inoculum comprising biological material (*e.g.*, microorganism) for use with whatever type of vegetative matter is being processed. (*See*, Specification at page 7, line 10; at page 9, lines 10-11; and at page 12, lines 17-21). As such, Applicants submit that the skilled artisan would be able to make and use the present invention as claimed without undue experimentation. Reconsideration and withdrawal are requested.

#### **Rejection under 35 U.S.C. §112, Second Paragraph**

The Examiner has rejected claims 28-34 under 35 U.S.C. §112, second paragraph, for being indefinite. Specifically, the Examiner indicates that there is insufficient antecedent basis in claims 28, 31 and 33 for the limitation "cellulose fibers" as the term was previously deleted from claim 19. (*See*, Office Action at page 4). Applicants disagree. Specifically, step (c) of claim 19 recites, "initial sorting of cellulose fibers by diameter." As such, Applicants submit there is proper antecedent basis for the limitation "cellulose fibers."

Reconsideration and withdrawal of the rejection is requested.

### Rejections under 35 U.S.C. §103

The Examiner has rejected claims 1-6, 8-16, 19 and 28-36 under 35 U.S.C. §103(a) as being unpatentable over US Patent No. 2,611,401 ("Burton") and US Patent No. 2,767,170 ("Graybeal") in view of US Patent No. 2,054,301 ("Richter").

The Examiner indicates that Burton discloses methods to disintegrate an agricultural waste product with jets of water operating at pressures between 600-100 psi (40-60 Atm), but that Burton does not teach or suggest separating the resulting cellulosic material by size. (See, Office Action at page 5). Moreover, the Examiner indicates that Graybeal also discloses using water jets to disintegrate an agricultural product and that the water jets with velocities from 100-500 feet per minute are used to break up aggregates of fibers and reduce fiber size by shear forces and collisions with other fibers, but Graybeal does not disclose screening of the resulting particles. (See, Office Action at page 5). However, the Examiner indicates that Richter discloses reducing the size of a batch or mass of cellulose fibers, forming particles of various sizes and screening and separating them by their size through successive screens of progressively finer mesh, which can then be dried. (See, Office Action at page 6).

In response to Applicants previous arguments that the cited references do not disclose separating individual fibers of cellulose, the Examiner stated that the invention did not claim separating individual fibers of cellulose but rather claimed particles, which can be fibers or bunches of fibers, or other, non-cellulose material. (See, Office Action at page 2). Further, in response to Applicants arguments that the references relate to already pulped cellulose, the Examiner stated that that claims did not expressly exclude other mechanical means for preparing the pulp (such as chipping, maceration, grinding etc.) before particles are exposed to water jets and separated by size. (See, Office Action at pages 2-3). Applicants have amended the claims, as described *infra*, to address the Examiner's comments.

Specifically, Applicants have amended claim 1, from which the remaining claims depend, to recite using high pressure fluid jets to initially break apart naturally-occurring vegetative raw matter directly into small particles comprising fibers of cellulose of predetermined size by applying pressure from the jets on the vegetative raw matter causing the vegetative raw matter to pass through a screen or grating (or through a series of screens or gratings), each comprising successively smaller openings than those of the previous screen or grating in the series, and

separating single cellulose fibers directly from the vegetative raw matter, wherein the single fibers have increased surface area compared to the vegetative raw matter and wherein the single fibers are not damaged following the use of the high-pressure fluid jets. Applicants traverse this rejection with respect to the claims as amended herein.

As amended, the claims require:

- Providing and placing naturally-occurring vegetative raw matter on a screen or grating with openings of a predetermined size;
- Using high pressure fluid jets to initially break apart said vegetative raw matter directly into small particles comprising cellulose fibers by forcing the vegetative raw matter to pass through the screen or grating;
- Separating single cellulose fibers directly from said vegetative raw matter, wherein the single cellulose fibers have increased surface area compared to the vegetative raw matter and are not damaged following the use of said high-pressure fluid jets

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. Further, the teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Moreover, a determination of whether the claimed subject matter as a whole would have been obvious at the time the invention was made involves factual findings with respect to secondary considerations, including unexpected results. *See, Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966).

Applicants submit that the combination of Burton and Graybeal in view of Richter does not teach or suggest all of the limitations of the pending claims as amended herein. Applicants further submit that the instant invention provides unexpected and superior properties and solves a long felt need in the art not taught or suggested by the combination of Burton and Graybeal in view of Richter.

For clarity purposes, Applicants are describing the teachings of the cited references individually but are traversing the rejection with respect to the combination of these references as described in further detail below.

Burton merely discloses a method for debarking logs by hydraulic means. Specifically, Burton teaches removing bark from a tree by using two hydraulic jets, which work together to remove the bark, one which cuts the bark and the other peels the bark away from the wood portion of the log. (See, Burton at column 2, lines 46-54 and column 4, lines 56-74). At best, the only common feature shared by Burton and the instant invention is use of fluid at high pressure. Besides this feature, the instant invention and Burton are completely different in design. Burton does not teach or suggest placing naturally-occurring vegetative raw matter on a screen or grating with openings of a predetermined size and does not teach or suggest initially breaking vegetative raw matter directly into smaller particles of cellulose fibers by forcing the vegetative raw matter through the screens or grates as required by the instant claims. Further, Burton does not teach or suggest the separation of single, undamaged cellulose fibers with increased surface area as required by the instant invention.

Graybeal does not cure the deficiencies of Burton. Graybeal merely teaches the use of jets to break up aggregated cellulose fibers in a preformed slurry. The methods of Graybeal are dramatically different and provide a noticeably different resulting cellulose fiber population than that described and claimed in the instant invention. Graybeal does not teach or suggest a method of separating single, undamaged cellulose fibers directly from naturally-occurring vegetative raw matter as required by the instant invention. Rather, Graybeal teaches a method of preparing alkali cellulose wherein the method is performed on a slurry of cellulose in particulate form only after the vegetative matter has been broken into particles. (See, Graybeal at column 1, lines 57-64). More specifically, Graybeal does not teach or suggest placing naturally-occurring vegetative raw matter on a screen or grating with openings of a predetermined size and forcing that vegetative raw matter to pass through the screen or grating using high pressure fluid jets to initially break apart the vegetative raw matter directly into cellulose fibers as required by the instant invention. In contrast, Graybeal does not use a screen or grating and does not use a high pressure fluid directed at vegetative raw matter to initially break apart the raw matter directly to cellulose fibers, but rather submits a preformed slurry of aggregated fibers (e.g., non-raw

vegetative matter which has already been broken into aggregates of cellulose fibers) to a high pressure system that forces the aggregated fibers through the jets and back into the vessel. It is this action of radically colliding the solution of aggregate fibers after passing through the jets into the vessel that reduces the fiber size. Further, Graybeal does not teach or suggest the separation of single, undamaged cellulose fibers with increased surface area as required by the instant invention. In fact, the separation of single undamaged cellulose fibers provided by the instant invention is not permitted following the methods of Graybeal. Specifically, although passing the slurry of aggregate fibers through the fluid jets allows the cellulose fiber aggregates to be pulled apart and disaggregated and permits the fibers to be rubbed together and moved relative to each other in the attrition zone, it does not permit the separation of single cellulose fibers. More importantly, the violent collisions produced by the disclosed methods of Graybeal lead to breakage and damage of the cellulose fibers and thus the methods of Graybeal cannot produce undamaged cellulose fibers produced by the instant invention which are essential for the production of high quality paper and other pulp derived products.

Richter does not cure the deficiencies of either Burton and/or Graybeal. Richter merely teaches a method of producing pulverulent cellulose. Richter, similar to Burton and Graybeal, does not teach or suggest placing naturally-occurring vegetative raw matter on a screen or grating with openings of a predetermined size and forcing that vegetative raw matter to pass through the screen or grating using high pressure fluid jets to initially break apart the vegetative raw matter directly into cellulose fibers as required by the instant invention. Rather, the methods of Richter are preformed on cellulose material only after vegetative raw matter has been broken part into particles by a beater or a jordan action. (See, Richter column 1, lines 1-7 and column 1, lines 42 through column 2, line 25). That is, Richter teaches the production of pulverulent cellulose from previously prepared pulp, not the separation of single cellulose fibers directly from vegetative raw matter as instantly claimed. Additionally, Applicants submit that Richter teaches away from the present invention. Specifically, while Richter teaches the use of screens in its methods of producing pulverulent cellulose, these screens are used in a manner directly contradictory to the screens or grates of the instant invention. That is, Richter utilizes screens to pulverize the fibers. By using screens in this manner, Richter cannot separate single, undamaged cellulose fibers with increased surface area as required by the instant invention. Thus, the combination of Burton and

Graybeal in view of Richter does not teach or suggest all of the limitations of amended claim 1, and those that properly depend there from, as is required to establish a *prima facie* case of obviousness.

#### Secondary Considerations

Moreover, the invention as claimed herein solves a long felt need in the art and provides superior benefits that are not taught or suggested by the combination of Burton and Graybeal in view of Richter. As described in the instant specification, the prior art methods of producing cellulose fiber pulp from vegetative matter (including the teachings of Burton, Graybeal and Richter) lead to the production of low grade, low quality pulp which dramatically decreases the quality and usability of products generated by this low grade, low quality pulp. Further, the prior art methods of producing cellulose fiber pulp are costly and are associated with high energy consumption and severe environmental consequences due to the use of environmentally harmful chemicals. Moreover, the prior art methods of producing cellulose fiber pulp have relied almost exclusively on using trees as the starting point which has tremendous climatic effects.

The instantly claimed methods solve these long felt needs in the art and provide unexpected and superior properties not taught in the prior art. Firstly, the instant methods are cost effective, simple and chemical free. That is, the instant methods utilize screens and grates of predetermined size in combination with high pressure fluid to initially break apart vegetative raw matter directly into cellulose fibers. The instant methods do not require complex or expensive machinery or devices and the instant methods do not require the use of environmentally damaging chemicals. Secondly, the instant methods permit the use of any virtually any type of cellulose containing material to serve as the naturally occurring vegetative raw material and does not rely on trees as the virtually exclusive source of cellulose fibers, which is invaluable for the future of the planet. Lastly and most importantly, the instant method permits the separation of single, undamaged, cellulose fibers with increased surface area. The existing mechanical methods known in the art break and damage the cellulose fibers which reduces the quality of the resultant pulp. The present invention solves this problem and permits paper produced from the cellulose pulp of the instant invention to be strong and resistant to discoloration when exposed to light. Applicants submit that these unexpected superior properties are not taught or suggested by

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the combination of Burton, Graybeal and Richter and further submit that the instant invention solves several long felt needs in the art.

Based on the foregoing arguments and amendments, Applicants submit that the pending claims as amended herein are not obvious over Burton and Graybeal in view of Richter. As such, reconsideration and withdrawal of the rejection is requested.

The Examiner has also rejected claims 7, 17 and 20-26 under 35 U.S.C. §103(a) as being unpatentable over Burton Graybeal and Richter in view of US Patent No. 5,055,159 ("Blanchette"). The Examiner indicates that Blanchette teaches a delignification process in which vegetative matter was placed in reactors containing water and an inoculum of a particular fungus. (See, Office Action at page 7). Claims 7, 17 and 20-26 depend directly or indirectly from claim 1 which is amended as articulated above. Applicants traverse the rejection with respect to the pending claims as amended herein.

The teachings of Burton Graybeal and Richter are described *supra*. Blanchette does not cure the deficiencies of Burton Graybeal and Richter. Blanchette merely teaches the biological pre-treatment of wood chops for making pulp through the use of fungus. (See, Blanchette at Column 3, lines 32-48). Blanchette does not teach or suggest placing naturally-occurring vegetative raw matter on a screen or grating with openings of a predetermined size and forcing that vegetative raw matter to pass through the screen or grating using high pressure fluid jets to initially break apart the vegetative raw matter directly into cellulose fibers as required by the instant invention. Further, Blanchette does not teach or suggest the separation of single, undamaged cellulose fibers with increased surface area as required by the instant invention. Thus, the combination of Burton Graybeal and Richter in view of Blanchette does not teach or suggest all of the limitations of amended claim 1, from which claims 7, 17 and 20-26 properly depend, as is required to establish a *prima facie* case of obviousness. Moreover, the invention as claimed herein solves a long felt need in the art and provides superior benefits that are not taught or suggested by the combination of Burton and Graybeal in view of Blanchette.

As such, reconsideration and withdrawal of the rejection is requested.



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The Examiner has rejected claim 27 under 35 U.S.C. §103(a) as being unpatentable over Burton, Graybeal and Richter in view of US Patent No. 5,013,404 ("Christiansen"). The Examiner indicates that Christiansen teaches a stabilized hydrogen peroxide for use as a bleaching agent. (See, Office Action at page 7-8). Claim 27 depends indirectly from claim 1 which is amended as articulated above. Applicants traverse the rejection with respect to the pending claims as amended herein.

The teachings of Burton, Graybeal and Richter are described *supra*. Christiansen does not cure the deficiencies of Burton, Graybeal and Richter. Christiansen merely teaches a process for alkaline hydrogen peroxide bleaching of mechanical wood pulp in a stabilized bleach solution. (See, Christiansen at Abstract). Christiansen does not teach or suggest placing naturally-occurring vegetative raw matter on a screen or grating with openings of a predetermined size and forcing that vegetative raw matter to pass through the screen or grating using high pressure fluid jets to initially break apart the vegetative raw matter directly into cellulose fibers as required by the instant invention. Further, Christiansen does not teach or suggest the separation of single, undamaged cellulose fibers with increased surface area as required by the instant invention. Thus, the combination of Burton, Graybeal and Richter in view of Christiansen does not teach or suggest all of the limitations of amended claim 1, from which claim 27 properly depends, as is required to establish a *prima facie* case of obviousness. Moreover, the invention as claimed herein solves a long felt need in the art and provides superior benefits that are not taught or suggested by the combination of Burton, Graybeal and Richter in view of Christiansen.

Reconsideration and withdrawal of the rejection is requested.

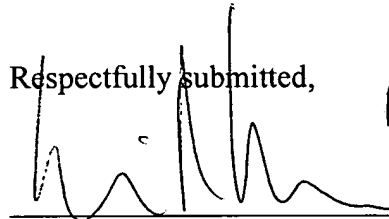
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### CONCLUSION

On the basis of the foregoing amendment and remarks, Applicants respectfully submit that the pending claims are in condition for allowance and a Notice of Allowance for the pending claims is respectfully requested. If there are any questions regarding this application that can be handled in a phone conference with Applicants' Attorneys, the Examiner is encouraged to contact the undersigned at the telephone number provided below.

Respectfully submitted,

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